12.   The method according to claim 10, wherein the hidden surface removal of said Z-buffer algorithm is executed only for said semitransparent object that is nearest to the viewpoint.

REMARKS

Claims 1-12 are pending in the application. Claims 1, 6 and 7 have been amended. Claims 10-12 are newly added. Reconsideration of this application is respectfully requested.

The Office Action objects to the Abstract of the Disclosure because it contains language that can be implied, such as "of the present invention" and "preferably". A replacement Abstract of the Disclosure is submitted herewith that eliminates the objected to language. Accordingly, it is submitted that the objection is obviated and should be withdrawn.

Claim 1 has been amended by the addition of (a), (b) and (c) before the three drawing steps. Claims 6 and 7 have also been amended so as to depend from claims 1 and 3, respectively.

The Office Action rejects claims 1-9 under 35 U.S.C 103(a) as unpatentable over U.S. Patent No. 5,923,333 to Stroyan, hereafter Stroyan, in view of U.S Patent No. 5,220,646 to Fossum, hereafter Fossum. Step (b) of claim 1 recites, inter alia, "drawing the semitransparent object alone of the image data without updating said Z-buffer". Stroyan does not draw the object, but rather draws the backward facing primitives of the object (see step 204 of Fig. 2 and accompanying text. Step (c) of claim 1 recites, inter alia, "drawing the semitransparent object alone of the image data while updating said Z-buffer". Stroyan does not draw the object, but rather draws the front facing primitives of the object. Accordingly, Stroyan does not teach steps (b) and (c) of claim 1.

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The Office Action concedes that Stroyan does not update the Z-buffer during his third pass. The Office Action then cites Fossum as teaching to turn the Z-buffer on and off while drawing a polygon. The Office Action then concludes that "...it would have been obvious to one of ordinary skill in the art to combine the systems of Stroyan and Fossum to yield a system wherein the Z-buffer can be re-enabled for the third pass, because by enabling the Z-buffer for the third pass, it is possible to draw and blend multiple transparent objects that are closer than the opaque object."

The Office Action also concedes that Stroyan does not teach a rendering engine that is capable of either selecting to output the data while updating the Z-buffer or not updating the Z-buffer, as recited in claim 3. The arguments that follow apply to both claims 1 and 3.

The conclusion of obviousness is erroneous. Stroyan teaches a three pass method that, in passes two and three, processes backward and forward facing primitives of transparent objects, respectively, while disabling the Z-buffer. That is, the results of passes two and three are sent to the frame buffer and not the Z-buffer.

Fossum discloses a single pass polygon drawing method that uses the Z-algorithm and the Z-buffer to display the complete image with hidden lines of polygons that are behind polygon surfaces that are closer to a viewpoint. Fossum's step 7 turns on the Z-buffer to assure that steps 8-12 do indeed display the image with hidden lines. For example, if a further away (from the viewpoint) polygon is first drawn with visible lines, steps 7-12 assure that, to the extent covered by a later drawn closer polygon surface, the visible lines are converted to hidden lines. See column 5, line 57 to column 6, line 55.

One skilled in the art would be unlikely to use Fossum's teaching of the hidden line portion of his algorithm in Stroyan's pass three, because Fossum deals with all primitives of an object and with displaying hidden lines and Stroyan's pass three deals with only front facing primitives of the objects and does not display hidden lines.

To extract only Fossum's step 7 of enabling the Z-buffer is a taking out of context for which one skilled in the art has no motivation. In fact, Fossum at column 1, lines 38-47, rejects and, therefore, teaches away from a three pass method as being inefficient and costly. This teaching contradicts any suggestion real or imagined to one of ordinary skill in the art to use Fossum's step 7 to enable the Z-buffer in Stroyan's pass three.

The only teaching of record is Applicants' teaching to enable the Z-buffer in the third step of a three step drawing method. Any use of Applicants' teaching to reconstruct the art is hindsight. Such a reconstruction based on hindsight cannot be the basis of a rejection under 35 U.S.C. 103. The prior art itself must suggest that modification or provide the reason or motivation for making such modification. *In re Laskowski*, 871 F.2d 115, 117, 10 USPQ 2d 1397, 1398-1399 (CAFC, 1989). "The invention must be viewed not after the blueprint has been drawn by the inventor, but as it would have been perceived in the state of the art that existed at the time the invention was made." *Sensonics Inc. v. Aerosonic Corp.* 38 USPQ 2d 1551, 1554 (CAFC, 1996), citing *Interconnect Planning Corp. v. Feil*, 774 F. 2d 1132, 1138, 227 USPQ 543, 547 (CAFC, 1985).

Claim 6 is for a raster scan display that can execute the drawing method of claim 1. Claim 7 is for a raster scan display having the drawing apparatus of claim 3. Accordingly, the arguments presented for claims 1 and 3 are fully applicable to claims 6 and 7.

For the reasons set forth above, it is submitted that the rejection of claims 1-9 under 35 U.S.C. 103(a) is erroneous and should be withdrawn.

Newly presented claim 10 recites that "during step (c) the semitransparent object that is nearest to a view point is earlier drawn by executing alpha blending, while updating said Z-buffer and executing the hidden surface removal by said Z-algorithm." Newly presented claim 11 recites that "during step (b) the semitransparent objects are alpha blended without regard to location relative to a view point." Newly presented
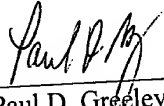
claim 12 recites that "during step (b) the hidden surface removal of said Z-buffer algorithm is executed only for said semitransparent object that is nearest to the viewpoint." Stroyan does not disclose or teach the features recited in claims 10-12.

Attached hereto is a marked-up version of the changes made to the specification and claims by the present amendment. The attachment is captioned "Version With Markings To Show Changes Made."

It is respectfully requested for the reasons set forth above that the rejection under 35 U.S.C. 103(a) be withdrawn, that claims 1-11 be allowed and that this application be passed to issue.

Respectfully Submitted,

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Application, Serial No. 09/433,475

IN THE SPECIFICATION

Please replace the Abstract of the Disclosure with the new Abstract of Disclosure that is appended hereto on a separate sheet of paper.

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Abstract of the Disclosure

A method is provided for multi-pass semitransparent processing having three passes. The method provides for displaying image data about a plurality of objects including opaque objects and semitransparent objects on a computer display screen by using an updatable Z-buffer as a storage, utilizing information about a depth direction for each object. A hardware resource capable of implementing the multi-pass method [of the present invention] is also disclosed. The hardware resource, for example, is [preferably] implemented as a drawing apparatus which can display image data about a plurality of objects including opaque objects and semitransparent objects on a computer display screen, utilizing information about a depth direction for each object.

IN THE CLAIMS

Please amend the claims as follows:

1.   (Twice Amended) A drawing method for displaying image data about a plurality of objects including an opaque object and semitransparent objects, each having information about a depth direction, on a computer display screen by using an updatable Z-buffer as a storage, said method comprising the steps of:

(a) drawing said opaque object alone of the image data, while updating said Z-buffer and executing a hidden surface removal by said Z-buffer algorithm;

(b) drawing said semitransparent objects alone of the image data without updating said Z-buffer and while executing the hidden surface removal by said Z-buffer algorithm; and

(c) drawing said semitransparent objects alone of the image data, while updating said Z-buffer and executing the hidden surface removal by said Z-buffer algorithm.

6.   (Amended) A raster scan display which can execute the drawing method of claim 1 [or 2].

7.   (Amended) A raster scan display having the drawing apparatus according to [any one of claims] claim 3 [through 5].